



TRANSACTIONS, AMERICAN GEOPHYSICAL UNION
VOLUME 62, NUMBER 41, OCTOBER 13, 1981

EOS

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VOL. 62, NO. 41, PAGES 697-704

OCTOBER 13, 1981

Tectonophysics

5110 Plate tectonics: THE SUBDUCTION OF THE EASTERN PANAMA BASIN AND THE RECONSTRUCTION OF NORTH-AMERICAN SOUTH AMERICA.
A. Pennington (Department of Geological Sciences, The University of Texas at Austin, Austin, Texas 78712).
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J. Geophys. Res., Vol. 86, Paper 18123

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Editorial

AGU Endowment

Exhortations on the need for good communications reach us from numerous and varied sources. But the need is particularly important in the dynamic fields spanned by the AGU. There are a few individuals who thrive on reinventing the wheel. But most of us, although we might enjoy such activity, would be likely to play chess, bridge, or engage in some other challenging and recreational activity. Professionally, we need to be aware of the state of the art to be certain we are working on real problems and taking maximum advantage of pertinent advances. And when we have something to report, we want to reach the widest possible audience. The reasons might be considered selfish by some, our egos, food for our table, etc. But our work cannot impact that of our colleagues if they're not aware of it, and no impact/no promotion.

Agency reports, journals, symposia, and personal contacts all contribute to the dissemination of information. But agency reports usually reach dozens or hundreds of individuals, while AGU journals reach thousands on first distribution, untold numbers after cataloging by abstract services, and are studied in university libraries for decades. AGU-sponsored meetings are primary vehicles for information dissemination through symposia and personal contacts. Clearly, a strong AGU is vital to our effectiveness as scientists.

AGU has been a strong and effective organization over the years and, it is hoped, even without the current fund drive would continue in that role. But is it hoped good enough for us in view of the central role of AGU in our profession? AGU has slim cash reserves to carry it through any of the economic difficulties it might encounter. Even though we do not face imminent or sudden disaster, a short-term difficulty could initiate a feedback loop of increased dues and decreased membership if the damping coefficient provided by cash reserves is inadequate. And it is an unduly pessimistic, wouldn't it be great if one day all members received red (or blue or green) JGR free with their dues?

There are many demands on our personal resources, including basic necessities, charitable contributions, and leisure time expenditures. But surely, participation in the AGU fund drive should rank high in priority for scientists in relevant fields in view of the significance of the activities of AGU to their future. And, just as surely, we old timers owe a debt of gratitude for the past impact of AGU on our careers.

R. J. Andrie
President, Geodesy Section

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GIFT

News

Budget Cuts Jeopardize Space Exploration

In the light of 12% across-the-board cuts in the second round of federal budgetary action, the announcement by the Office of Management and Budget that the cut to be absorbed by NASA is only 6% appears to be good news. But this is not at all the case, even though the reduced NASA FY 1982 budget would still be above the FY 1981 budget by about 4%, because the first mission costs of the space shuttle. The portion of the budget for the shuttle still seems to be reserved, untouchable, basically as it was after the first budget-cutting round. Further, the shuttle's costs are rising, and NASA's budget for the following year (FY 1983) is subject to larger cuts—a figure of about \$1 billion has been mentioned.

An idea of the severity of impact on NASA's operations can be had by noting one possible course now being considered: to cancel further operation of the Voyager mission. Voyager has been rolling for over a decade, but future operation costs could be prohibitive. The space sciences community is shocked to think that as Voyager heads toward Uranus and Neptune for the first chance to obtain observations, the tracking stations, the receiving circuits, the highly sophisticated and delicate instrumentation, which have been part of an immensely dedicated effort, might be shut off. The spacecraft would get there, but no data would be obtained.

In summary, the proposed budget cuts could mean the virtual elimination of space exploration and science from NASA's program. Not only Voyager could be lost but the Deep Space Network, the Comet Halley and Galileo missions, and other missions (such as the International Solar Polar Mission) are in jeopardy of being cut. In fact the entire planetary science and applications functions, including the Jet Propulsion Laboratory and other NASA facilities, could disappear. In one possible scenario following the budget cuts, space shuttle and Space Telescope would remain. In describing the impact of the second-round, proposed budget cuts on NASA's programs, *Chemical and Engineering News* (Oct. 5, 1981) stated, "... all ideas for new projects would have to be shelved for some time."

The affects of NASA's budget cuts have already spread to the European space community. *New Scientist* (Oct. 1, 1981, p. 2) describes NASA's current development as 'NASA's high noon'.

The mood at NASA is bleak. The space agency did not grieve when President Reagan, for the "national good," cut into its plans for the rest of the decade. But an aura of frustration is unmistakable. Reagan's financial policies have injected an element of uncertainty into the financial equation, and for undertakings that require several years of advance planning, uncertainty is anathema.

The reality of a devastating budget cut that would eliminate NASA's programs of exploration of the solar system is difficult to assess. NASA headquarters is preparing a series of "last stand" proposals to submit to the White House.—PMB

Guagua Pichincha Volcano

Guagua Pichincha Volcano, north central Ecuador (0.17°S, 78.60°W). All times are local (GMT - 5 hours).

A small phreatic explosion that probably occurred in mid-August deposited fine tephra as much as 1 km southeast of three new vents (3-8 m in diameter) in the summit crater. The new vents formed just east of a lava dome, about 400 m in diameter, emplaced in the center of the summit crater, probably in 1660. Pichincha's horseshoe-shaped summit crater, about 2 km in diameter and 600 m deep, occupies the west end of a 9-km-long messid and is breached to the west. In the opposite direction from Ecuador's capital Quito (population 600,000), which is located at the east foot of the volcano. Aerial observers reported increased luminescent activity in the summit crater about August 20. Plume heights of as much as several hundred meters were reported in mid-August, and a group that climbed the volcano in early September observed a 200- to 300-m-high plume, but vapor emission had declined to only 2-3 times its normal level by early October. Temperatures of summit crater fumaroles in early October were 88°-90°C, comparable to those recorded in 1978.

Selsmographs at Quito and at Colopexi volcano (60 km to the south southeast) recorded a series of earthquakes, some of which were large enough to be felt. However, the volcano is in a tectonically active zone, and none of those events were large enough to be detected by the worldwide seismic net. Earthquakes on August 12 at 0804 (probably centered near Quito) and August 21 at 0718 (probably centered about 40 km south of the volcano) had Modified Mercalli intensities of III-IV in Quito. Smaller events recorded on August 25 at 0651 and August 26 at 1311, both apparently centered about 40 km south of the volcano, were not felt, but residents of Quito noticed an event on August 28 at 1822 that probably had a nearby epicenter. Selsmographs installed on the north, east, and south flanks of the volcano September 25-27 had recorded no local seismicity (magnitude threshold about 1.5) as of October 7. Dry tilt stations were emplaced beginning 28 September at sites 11.25 km north-northeast, 9 km east, and 7.25 km south-southwest of the central dome.

A UNDRO volcanological team of John Townhill, Karl Grönqvist, and J. C. Sabroux arrived in Ecuador October 1. Chemical analyses of gas samples collected by Sabroux on October 5 will be compared to his analyses of gases collected from the same fumaroles in 1976.

The last major eruption from Guagua Pichincha occurred in 1660, when 40 cm of ash fell on Quito and noises and rumbles flowed down the west flank. Several minor phreatic eruptions were reported in the 19th century, the most recent in 1881.

Information contacts: Minard Hall, Escuela Politécnica, Casilla 2758, Quito, Ecuador; J. C. Sabroux, Centre des Faibles Radioactivités, CNRS, 91190 Gif Sur Yvette, France; National Earthquake Information Service, U.S. Geological Survey, Stop 967, Denver Federal Center, Box 25046, Denver, Colo. 80225. ☐

EOS
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The Weekly Newspaper of Geophysics

Send double-speed manuscripts (four copies) to Eos, AGU, 2000 Florida Avenue, N.W., Washington, D.C. 20009, or send them directly to one of the associate editors with a copy to the above address.

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Eos, Transactions, American Geophysical Union (ISSN 0098-3941) is published weekly by the American Geophysical Union from 2000 Florida Avenue, N.W., Washington, D.C. 20009. Subscription available on request. This issue \$5.00. Second-class postage paid at Washington, D.C., and at additional mailing offices.

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Cover. (Top) San Francisco's Mission Dolores, which was founded by the Franciscan padre on June 29, 1776, as it appears today. The construction of the present building began in 1782. Adjacent to the mission stands the Baileia built in 1916. (Bottom) When San Francisco was still under Spanish rule, Mission Dolores was known as the Mission San Francisco de Asis. (Photos courtesy of San Francisco Convention and Visitors Bureau.)

Petroleum Companies Withdraw From OMDP

The 10 petroleum companies that were to split the costs of the Ocean Margin Drilling Program (OMDP) (*Eos*, February 19, 1980, p. 90) with the National Science Foundation have withdrawn their support from the project. According to Allen M. Shinn, Jr., director of NSF's Office of Scientific Ocean Drilling, the petroleum companies stated that they are not willing to support the fiscal 1982 efforts as planned. Participation at a future date remains uncertain.

The move will indefinitely delay OMDP, Shinn told *Eos*. "I don't think we [NSF] can continue with the program as it is outlined now," he added.

OMDP was to be a joint industry-government venture to explore the geology and, indirectly, the petroleum prospects of the continental slope and the ocean margins. The joint program, which would have involved much engineering innovation, was promoted by the Carter Administration. In particular, Frank Press, now president of the National Academy of Sciences, worked to achieve acceptance of the government-industry program. Government and industry were to split the first-year costs of \$25 million. It appears that only government funds will be available now.

In August, NSF reorganized its drilling programs (*Eos*, September 1, p. 852), combining the Deep Sea Drilling Project (DSDP) and OMDP. The reorganization, which called for the retirement of the *Glomar Challenger* and the use of the *Glomar Explorer* as NSF's sole drilling ship, also called for a delay in drilling along the ocean margins. Support for the reorganization from the academic community generally was positive, but reaction from industry had been mixed.

The question now is how the program will proceed. The National Science Foundation will have to reformulate its effort; current wisdom within the academic oceanographic community is that withdrawal of the oil companies actually may be beneficial in certain respects. Most likely, the highly successful program that utilized the *Glomar Challenger* will be continued, but the program probably will not proceed with the haste or with the commercial incentives provided by the cooperation of industry. Instead, more emphasis will be placed on basic research, which is perceived as desirable by many sectors of the ocean-floor geology community.—PMB and BTR

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The Department of Geology of the University of New Mexico is pleased to invite nominations or applications for the Caswell Silver Distinguished Professorship in Geology. This endowed professorship shall be awarded for periods of up to two years to earth scientists of distinguished accomplishment and international reputation. The professorship may be held by scientists of all specialties of the earth sciences in the broadest sense, and the major criterion for selection is that the individual be an active, productive leader in his or her field of research. The recipient must carry out a vigorous research program while in residence at UNM. The recipient is expected to interact with the faculty and students of the Department and to provide one or more seminars in an advanced topic of his/her choice, during each academic year. The Foundation will provide unusually advantageous remuneration commensurate with the distinguished nature of the appointment. In addition, a generous allocation for travel and operating expenses (to include secretarial support, analytical services in department laboratories, use of field vehicles, and preparation of manuscripts) will be provided.

Applications or nominations should include a detailed resume and brief statement of major research accomplishments. Applications or nominations should be forwarded to:

Rodney C. Ewing, Chairman
Department of Geology
University of New Mexico
Albuquerque, New Mexico 87131



The deadline for applications is January 1, 1982.
The Caswell Silver Foundation is an equal opportunity employer.

University of Maryland/Faculty Position. The University of Maryland is seeking applications from highly qualified scientists for a tenure track faculty position at the assistant or associate professor level in the Department of Meteorology. Candidates must have a Ph.D. in meteorology, physics, engineering or chemistry and have an area of specialization that will enable them to lead a research program in environmental physics and air pollution. The research activity of the candidate should complement the meteorological research of the Department and continue the strong interaction in the physical sciences across departmental lines. Duties will include teaching senior graduate courses related to environmental physics and air pollution and developing an active research program. Salary will be commensurate with qualifications and experience. All applicants should send curriculum vitae, a brief statement of research interests and names, addresses and telephone numbers of those professional references to: Professor Ferdinand Gear, Chairman, Department of Meteorology, University of Maryland, College Park, MD 20742. Closing date for applications is 1 December 1981.

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Position in Reflection Seismology/Rice University, Houston, Texas. The Department of Geology plans to expand its geophysical program. Emphasis will be on reflection seismology. At the time applications are for the first of two open faculty positions. The successful applicant will help in the search for and selection of the second faculty member.

Your main responsibility will be to lead our department into the area of modern reflection seismology. Your main teaching and research interests should be in the acquisition and processing of reflection seismic data. You should also help in developing courses for undergraduate and graduate students, which are supported by the traditional strength of the Math Sciences, Physics, and Electrical Engineering Departments at Rice. Enthusiasm to work with and undertake some joint projects with our geologists is essential.

Our plans to acquire a computer system configured for high quality data processing. Substantial seed money for this facility is already in hand. Creative cooperation with the oil and geophysical industry in Houston, including a reasonable amount of consulting, is encouraged. Salary will be commensurate with qualifications and experience. Please send your curriculum vitae, a summary of experience in seismic processing, a statement of research interests, and names of three or more references to: Dr. A. W. Bely, Chairman, Department of Geology, Rice University, P.O. Box 1892, Houston, Texas 77001. Application deadline—December 1, 1981.

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Stanford University. A postdoctoral or research associate appointment is available in the area of space plasma physics. Topics of study include data from electron beam experiments aboard the space shuttle and the behavior of low energy plasma in the magnetosphere. Resumes and names of three references should be sent to Professor P. M. Banks, Radio Science Laboratory, Department of Marine Science at the University of Stanford, Stanford, CA 94305.

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Instrumental Analysis/Staff Research Associate. The University of Maryland is seeking applications from highly qualified scientists for a tenure track faculty position at the assistant or associate professor level in the Department of Meteorology. Candidates must have a Ph.D. in meteorology, physics, engineering or chemistry and have an area of specialization that will enable them to lead a research program in environmental physics and air pollution. The research activity of the candidate should complement the meteorological research of the Department and continue the strong interaction in the physical sciences across departmental lines. Duties will include teaching senior graduate courses related to environmental physics and air pollution and developing an active research program. Salary will be commensurate with qualifications and experience. All applicants should send curriculum vitae, a brief statement of research interests and names, addresses and telephone numbers of those professional references to: Professor Ferdinand Gear, Chairman, Department of Meteorology, University of Maryland, College Park, MD 20742. Closing date for applications is 1 December 1981.

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Field Research Positions. The Exploration Research Laboratory of the Colorado School of Mines may have openings for a field party manager and/or an assistant field party manager on or about January 1, 1982. Position level will be negotiated based on qualifications. This position involves, principally, seismic data acquisition but the person may participate in a wide range of field activities including geology, geophysics, and geodesy. This is an opportunity to participate with a large geophysics research and development group. Specific responsibilities include planning and coordination of field work, training of crew members, and supervision of pre-processing. The position is most challenging and offers wide scope for initiation and acceptance of responsibility. Interaction with industry professionals, ERI, staff, and faculty members of the Department of Geophysics is required. It is a position for growth, and challenge. A bachelors or masters degree is required for each of the positions. Field crew experience would be helpful. Ability to direct subordinates, interface with diverse groups, and communicate results is essential. Extensive field time is required for the Assistant Field Manager. Significant field time is required for the Manager. Schedules are not firm and are subject to research commitments and research time frames. Typical academic environment brings benefits are available. If interested in further details or in submitting an application, contact Dr. James K. Applegate, Director, Exploration Research Laboratory, Colorado School of Mines, Golden, Colorado 80601.

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Groundwater Hydrologist. The Minnesota Department of Natural Resources, Division of Waters has a vacancy at the Principal Hydrologist level for an experienced groundwater hydrologist to provide leadership for a program of groundwater studies and monitoring to support State Water allocation decisions and to provide quantitative assessments for planning and management purposes. Address inquiries and requests for application forms to: Sarah P. Tulford, DNR-Division of Waters, Third Floor Space Center Building, 444 Lafayette Road, St. Paul, Minnesota 55101. Present salary range: \$23,323 to \$31,132 annually, subject to revision in the near future.

University of South Florida. 3 New Faculty Positions in Department of Marine Science: The Department of Marine Science at the University of South Florida, St. Petersburg, announces the establishment of three new faculty positions beginning in September 1982. Applications from persons in the following specialties are especially encouraged: Microbial ecology, marine ichthyology, carbonates, paleontology, stable isotope paleoecology, and physical oceanography.

Rank and salary will depend upon professional experience and accomplishment. The minimum stipend for Professor is \$30,000; Associate Professor, \$22,000; and assistant professor, \$20,000. The nine-month positions are fully state supported and tenured. Duties will include approximately 75% research and 25% teaching. Applicants must have the Ph.D. in the field appropriate to their specialties and promising records of research accomplishment. The closing date for the receipt of applications is January 31, 1982.

Applicants should send resumes with three references to: Chairman, Department of Marine Science, University of South Florida, 140 Seventh Avenue South, St. Petersburg, FL 33701.

The University is an affirmative action/equal opportunity institution.

University of California, Davis Igneous Petrologist. The Department of Geology invites applications for a tenure-track position in the field of igneous petrology, at the Assistant Professor level, effective for the academic year 1982-1983. Preference will be given to candidates whose research demonstrates a thorough understanding of field, theoretical and experimental approaches to the advance and who show promise for high caliber research on fundamental problems. The successful candidate will be expected to contribute effectively to the existing teaching program in igneous petrology at both the undergraduate and graduate levels. Departmental facilities include a thin-section laboratory and electron microprobe, both of which are supported by full-time personnel, an experimental laboratory with high pressure piston cylinder and low pressure externally heated equipment, a scanning electron microscope, stable isotope laboratory, as well as the usual equipment (XRF, XRD, computers, etc.). The University of California at Davis is located conveniently to areas containing all types of igneous rocks.

The final date for receipt of applications is February 1, 1982. The University of California is an equal opportunity/affirmative action employer. Interested individuals should send their resumes to:

Jana H. Lippe, Chair
Department of Geology
University of California
Davis, California 95616

Faculty Positions: The University of Iowa. The Department of Physics and Astronomy anticipates one or two openings for tenure-track faculty in August 1982. One or more visiting professorships, at any rank, are also expected to be available. Preference will be given to candidates with research activity in the following experimental and theoretical areas: astrophysics, geophysics, atomic physics, condensed matter physics, elementary particle physics, nuclear physics, plasma physics, and space physics. The positions involve undergraduate and graduate teaching, guidance of research students, and personal research. Interested persons should send a resume, a statement of research interests, and the names of three professional references to Search Committee, Department of Physics and Astronomy, The University of Iowa, Iowa City, IA 52242.

The University of Iowa is an equal opportunity/affirmative action employer.

Geophysical Fluid Dynamics/Physical Oceanographer. Applications are solicited for a junior faculty position in ocean physics or dynamics to begin in the academic year 1982-83. Areas of interest to the Department include analytical, numerical and laboratory modeling of physical processes and phenomena in the sea.

Curriculum vitae, publications, and the names of three or more references should be sent by 31 December 1981 to: Robert S. Gordon, Chairman, Department of Geology and Geophysics, P.O. Box 8666, New Haven, CT 06511.

Faculty Positions: The University of Alabama. Applications are invited for three tenure track positions to be filled by Aug. 18, 1982. Two of the positions are expansion to accommodate a developing Ph.D. program. Applicants would be expected to teach undergraduate and graduate courses and actively pursue research. Ph.D. is required for retention of position. Assistant Professors preferred.

Position 1—Structural Geologist. Hydrogeology, applied geophysics, low temperature geochemistry, economic geology/ore deposits, coal petrology, paleontology, and physical sedimentology. Closing date: Jan. 15, 1982. Send resume, transcript, and three letters of reference to: Dr. W. Gary Hooks, Acting Chairman, Department of Geology, The University of Alabama, Box 1945, University, AL 35886.

The University of Alabama is an equal opportunity/affirmative action employer.

Faculty Position: Environmental Engineering. Beginning January or September 1982. The position requires undergraduate and graduate teaching and sponsored research activities in the areas of water quality control and water resources. An earned doctorate is required and at least a degree in civil engineering is preferred. Rank will be at the assistant professor level and salary will depend upon qualifications. Apply to: Dr. Lester A. Hoel, Chairman, Department of Civil Engineering, University of Virginia, Charlottesville, Virginia 22901.

An affirmative action/equal opportunity employer.

POSTDOCTORAL FELLOWSHIP The Naval Postgraduate School, Monterey, CA.

We are seeking a recent doctoral graduate with an interest in geomagnetics and some background in geophysical instrumentation and computer data analysis. The candidate will be expected to participate in ongoing experimental program of sea floor magnetic measurements using the School's research vessel and remote land based station. Stipend commensurate with current practices. For further information, contact Prof. O. Heinz, Dept. of Physics, Naval Postgraduate School, Monterey, CA, 93940, or call (408) 646-2118.

NPS is an equal opportunity/affirmative action employer.

Structural Geologist/University of Wyoming. The University of Wyoming, Department of Geology and Geophysics seeks applicants for a tenure track position in structural geology expected to be available beginning fall semester 1982 or earlier. Duties will include teaching of undergraduate and graduate courses in structural geology, supervising MS and PhD theses, and research in structural geology. Appointment at assistant professor level is preferred, but applicants requesting appointment at higher rank will be considered. Salary open. Applicants must have PhD degree and be versed in quantitative theory as well as field applications or modern structural geology and regional tectonics.

Applicants should provide, by January 1, 1982, a resume, three letters of reference, and a letter of application including a statement of current research interests and courses which the applicant feels qualified to teach. Applications should be sent to:

Dr. Robert S. Houston/Head
Department of Geology and Geophysics
University of Wyoming
Laramie, Wyoming 82071-3006.

The University of Wyoming is an equal opportunity/affirmative action employer.

Engineering Geologist/Geophysicist. The Department of Geological Sciences, University of Saskatchewan, has a recent tenurable position in engineering geology/geophysics. Applicants should be qualified to teach undergraduate and graduate courses and to conduct research in engineering geology. A background in structural geology may be appropriate. Well-equipped facilities are available for research in rock mechanics, fluid flow through porous media, acoustic, and electrical properties of rocks, and permafrost. Good opportunities exist for joint research with qualified students and experience. Send applications, detailed personal resume including the names of at least three references, and other supporting data to: Dr. W.G.E. Caldwell, Head, Department of Geological Sciences, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 0V0.

Please note: until November 15, 1981 consideration will be given only to applicants who are citizens or landed immigrants, after that date all applications will be considered.

City University of New York, (Brooklyn College) Faculty Positions. The Department of Geology anticipates filling several tenure track positions at Full Professor level. (Salary range up to \$43,400). Highly qualified individuals will be considered for distinguished appointments at an additional \$6,000.

With candidates who have distinguished themselves in any field are welcome to contact us, we are particularly interested in openings in: energy resources (coal/petroleum), exploration geophysics, environmental geology or hydrogeology, coastal sedimentology, economic geology.

Successful applicants will be required to institute an active research program, supervise Master's and Ph.D. theses. Nominations and applications with current vitae should be sent to: Dr. S. Shattuck, Chairman, Dept. of Geology, Brooklyn College of City University of New York, Brooklyn, New York 11210. Positions open until filled.

Brooklyn College, CUNY, is an affirmative action/equal opportunity employer.

Virginia Polytechnic Institute and State University/Senior Research Associate. Involvement and abundant research and publishing opportunities. Including new University-owned MDS-10 VEROSIS system, VAX 11/780 computer. Must have experience in theory and application of reflection seismology, and be interested in the application of reflection seismology to the solution of geologic problems.

Send resumes to: Dr. O. R. Wones, Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0706.

The University is an equal opportunity/affirmative action employer.

Yale University/Department of Geology and Geophysics. Applications are solicited for a faculty position in solid earth geophysics to begin in the academic year 1982-83. Areas of interest to the Department include seismology, exploration geophysics, mechanical and physical properties of rocks and minerals, geomagnetism, and tectonophysics.

Yale University is an equal opportunity/affirmative action employer and encourages women and members of minority groups to compete for this position. Curriculum vitae, publications, and the names of three or more references should be sent by 31 December 1981 to: Robert B. Gordon, Chairman, Department of Geology and Geophysics, P.O. Box 666, New Haven, CT 06511.

Assistant Professorships/University of Virginia. The Department of Environmental Science, University of Virginia invites applications for two tenure track assistant professorships beginning September 1982.

—*Seismology/meteorology*
—*Environmental chemistry/geochemistry*
—*Water resources/hydrology*

Applicants should have a Ph.D. and expect to teach undergraduate and graduate level courses in their area of specialization and to pursue a vigorous research program within the context of an interdisciplinary department. A curriculum vitae, a brief statement of research interests and names of three references may be submitted to: Dr. J. W. B. Area Personnel Office, 4301 Ricks Road, University of Virginia, Charlottesville, Virginia 22903.

The University of Virginia is an equal opportunity/affirmative action employer.

Pewee University. The Department of Geosciences invites applications for a faculty position, starting January or July 1982, in the broad field of geology-petrology-geochemistry. A Ph.D. is required and preference may be given to scientists with a background in research. The Department has an automated electron microprobe, mass spectrometer and laboratory for stable isotope studies. A range of high temperature and high pressure equipment, including furnaces for controlled experiments, as well as X-ray equipment. The successful applicant will be expected to participate in the department's teaching and graduate research programs, as well as actively engage in research. Rank and salary are open but will be commensurate with qualifications.

Seismologist/University of Utah. Search extended: The University of Utah is expanding its geophysics program in the Department of Geology and Geophysics by adding a tenure track faculty member in seismology at the assistant to associate professor level. Applicants with backgrounds and specialties in seismic reflection, seismic imaging, and theoretical seismology will be given preference. The individual will be expected to teach undergraduate and graduate courses, and to pursue an active research program with graduate students. The department has modern teaching and research programs in geology and geophysics, and has close associations with the numerical analysis and data processing groups in computer science, electrical

engineering and mathematics. The geophysics component of the department has strong research and teaching programs in seismology, tectonics and electromagnetic methods. Thermal properties of the earth, and potential fields. Current research in seismology includes: seismological and earthquake research utilizing a new PDP 11/70 computer with plotter and terminals; monitoring of the intermediate seismic belt by a 55 station telemetered network utilizing a new on-line PDP 11/34 computer; major experiments in seismic refraction profiling; investigations of seismic propagation from synthetic seismograms; application of inverse theory to seismology; seismic properties of volcanic systems and related research in tectonophysics. The closing date for applications is December 31, 1981. A Ph.D. is required for this position. Applicants should submit a vita, transcripts, a letter describing his/her research and teaching goals, and names of live persons for reference to: William P. Nash, Chairman, Department of Geology and Geophysics, University of Utah, Salt Lake City, Utah 84112.

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Supervisory Physical Scientist. The Research Facilities Center (RFC) of NOAA in Miami, Florida, is seeking a senior level scientist to manage its Research Systems Group. The RFC equips, maintains, and operates aircraft, helicopters and ground based equipment specifically for atmospheric, oceanographic and environmental research. The incumbent will direct a group of scientists, engineers and technicians involved with collection, calibration, quality control, formatting, documenting and delivery of data to users of the RFC. This position is in the Competitive Service. The grade and anticipated base salary of the position is GS-14, \$37,871 per annum. Future salary adjustments are subject to the Merit Pay System. QUALIFICATIONS: BS or higher degree in meteorology, physics, math, oceanography, or the physical sciences. In addition, 3 years of professional experience which has equipped the candidate with the knowledge necessary to perform the above duties. SELECTIVE FACTORS: Applicants must have experience in a research and developmental environment and be capable of directing research in instrumentation, physics, calibration techniques, advanced computer techniques and spectral analysis. Additional technical information may be obtained from Dr. C. B. Emmanuel (305) 526-2938 or FTS 350-2938. TO APPLY: Current or former federal employees should submit SF-171 and CD-332 (Employee Appraisal). Form CD-332 may be obtained by calling (305) 361-4454 or FTS 350-1454. Applicants not employed by the Federal Government should submit a complete application package for "Physical Science Positions-1300". These forms may be obtained from the nearest Office of Personnel Management (OPM). ALL APPLICANTS MUST SUBMIT THEIR PUBLICATIONS RECORD. All applications must be submitted to: NOAA/ERL Area Personnel Office, 4301 Ricks Road, University of Virginia, Charlottesville, Virginia 22903.

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Graduate Teaching & Research Assistantships/University of Houston. Graduate teaching & research assistantships available to qualified persons interested in Space Physics at the University of Houston. Our experimental program involves rocket & balloon-borne studies of the ionosphere & magnetosphere-atmosphere coupling. Emphasis has been on active experiments, most recent being a rocket-balloon campaign at Siple station, Antarctica in December 1980. Future work includes a study of pulsating aurora & participation in WISE-86, an auroral quantum electrodynamics experiment. The theoretical program is on plasma waves in the solar wind & modeling of phenomena related to current experiments. Assistantships for first year students begin at \$800 mo along with out of state tuition waiver. Graduate Chairman, Physics Dept., University of Houston Central Campus, Houston TX 77004 EDE

Purdue University is a land grant, state supported institution committed to academic excellence, and is an equal opportunity/affirmative action employer. For further information please contact Dr. Henry O. A. Meyer, Dept. of Geosciences, Purdue University, West Lafayette, IN 47907 (Tel. 317-494-3271). Closing date for applications is November 10, 1981.

Supervisory Physical Scientist. The Research Facilities Center (RFC) of NOAA in Miami, Florida, is seeking a senior level scientist to manage its Research Systems Group. The RFC equips, maintains, and operates aircraft, helicopters and ground based equipment specifically for atmospheric, oceanographic and environmental research. The incumbent will direct a group of scientists, engineers and technicians involved with collection, calibration, quality control, formatting, documenting and delivery of data to users of the RFC. This position is in the Competitive Service. The grade and anticipated base salary of the position is GS-14, \$37,871 per annum. Future salary adjustments are subject to the Merit Pay System. QUALIFICATIONS: BS or higher degree in meteorology, physics, math, oceanography, or the physical sciences. In addition, 3 years of professional experience which has equipped the candidate with the knowledge necessary to perform the above duties. SELECTIVE FACTORS: Applicants must have experience in a research and developmental environment and be capable of directing research in instrumentation, physics, calibration techniques, advanced computer techniques and spectral analysis. Additional technical information may be obtained from Dr. C. B. Emmanuel (305) 526-2938 or FTS 350-2938. TO APPLY: Current or former federal employees should submit SF-171 and CD-332 (Employee Appraisal). Form CD-332 may be obtained by calling (305) 361-4454 or FTS 350-1454. Applicants not employed by the Federal Government should submit a complete application package for "Physical Science Positions-1300". These forms may be obtained from the nearest Office of Personnel Management (OPM). ALL APPLICANTS MUST SUBMIT THEIR PUBLICATIONS RECORD. All applications must be submitted to: NOAA/ERL Area Personnel Office, 4301 Ricks Road, University of Virginia, Charlottesville, Virginia 22903.

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1981 AGU Fall Meeting

The 1981 Fall Meeting will be held at the Jack Ter Hotel and the Holiday Inn/Golden Gateway in San Francisco from December 7-11.

Registration

Everyone who attends the meeting must register. Preregistration (received by November 17) saves you time and money, and the fee will be refunded if AGU receives written notice of inability to attend by November 30. Registration rates are as follows:

	Preregistration	At-Meeting (after 1/1/77)
Member	\$55	\$70
Student Member	\$25	\$40
Nonmember	\$75	\$90
Student nonmember	\$32	\$47

Registration for 1 day only is available at one half the above rates. Members of the American Meteorological Society, the American Society of Photogrammetry, Union Geofisica Mexicana, American Congress on Surveying and Mapping, and the Canadian Geophysical Union may register for the meeting at the AGU member rates.

The difference between member (or student member) registration and nonmember registration may be applied to AGU dues if a completed membership application is received at AGU by February 13, 1982. Current AGU annual membership rates are: \$20 members; \$7 student members.

To preregister, fill out the registration form, and return it with your payment to the AGU Office. Your receipt will be included with your preregistration material at the meeting. Preregistrants should pick up their registration material at the preregistration desk of the Holiday Inn/Golden Gateway Hotel. Complimentary badges for guests not attending the scientific sessions will be available at the registration desk.

Scientific Sessions

See Program Summary next page. Both hotels will be used for all disciplines.

Hotel Accommodations

A block of rooms (\$41 singles; \$47 doubles) is being held for meeting attendees at the Jack Ter Hotel and the Holiday Inn/Golden Gateway. Reservations are processed as they are received, so if you wish to stay at a particular hotel, you should make your reservation as early as possible. Remember your fellow scientists need a room. Reserve in one hotel only. Don't be a no-show!

Reservations must be received by November 12 to be confirmed. Please use the form provided to be assured of the special AGU rate, and mail it directly to the hotel of your choice. Do not write or call the AGU office for room reservations.

Free parking is available only for registered guests at each hotel.

Social Events

Two parties are planned for registrants. The Ice Breaker will be on Monday at the Jack Ter Hotel; and a wine and cheese party on Thursday at the Holiday Inn/Golden Gateway Hotel.

Complimentary refreshments will be served daily at both hotels from 8:30 to 10:30 A.M. and 2:30 to 3:30 P.M.

AMERICAN GEOPHYSICAL UNION 1981 FALL MEETING REGISTRATION FORM

Jack Ter Hotel/Holiday Inn
Golden Gateway Hotel
December 7-11, 1981
San Francisco, California

PLEASE PRINT CLEARLY.

Badge Identification

NAME ON BADGE

AFFILIATION

MAILING ADDRESS

Telephone #

Address during the meeting if different than above

Members

The difference between member (or student member) registration and nonmember registration may be applied to AGU dues if a completed membership application is received at AGU by February 13, 1982. Current AGU annual membership rates are \$20 Members; \$7 Student Members.

Preregistrants

Your receipt will be in your preregistration packet. The registration fee will be refunded if written notice of inability to attend is received in the AGU office by November 17. The program and meeting abstracts will appear in the November 18 issue of EOS, which is mailed to all members in advance of the meeting.

Office Use

Code

Check box

Charge to

Card Number

Interbank

Expiration Date

Signature

Business Meetings and Sections Luncheon/Dinner

The AGU Council will meet Sunday at 5:00 pm in the Japanese Pavilion (formerly the Garden Room) of the Jack Ter Hotel.

The Tectonophysics section business meeting will follow an afternoon technical session on Monday evening at 5 o'clock in the International Room, Jack Ter Hotel.

The Nikko, Van Ness and Pine; the Casa de Cristal, 1122 Post Street; and the Four Seas, 731 Grant Avenue, are the restaurants that will provide an atmosphere of conviviality for the section luncheons and dinner as listed below:

Tuesday, December 8

Geodesy	Casa de Cristal	noon	\$8.00
Solar-Planetary Relationships	Nikko	noon	\$3.75 (subsidized)

- Program: Jim Dieterich, USGS Program Coordinator for Earthquake Prediction, will speak on the current status of the National Earthquake Prediction Program.
- Sponsors: Kinetronics, Inc.; Teledyne Industries, Inc.; W. F. Sprengel Instrument Co., Inc.

Wednesday, December 9

Hydrology	Casa de Cristal	noon	\$8.00
Oceanography	Nikko Banquet room	noon	\$8.25

- Program: Ferris Webb will speak on Research Outlook from NOAA.

Advance reservations are suggested (SPR-required) and will be processed as they are received based on availability of space. Complete the registration form now.

PLEASE CHECK ACCOMMODATIONS

Single	<input type="checkbox"/>	\$41.00
Double Bed (2 persons)	<input type="checkbox"/>	\$47.00
Twin Beds (2 persons)	<input type="checkbox"/>	\$47.00

SUITES UPON REQUEST

Extra Person - \$12 (H); \$14 (J). No charge for children under 12 sharing parent's room. All rooms subject to city tax. Parking in our building garage is free to all registered guests.

Please note: Reservations must be received by Nov 12 in order to be confirmed. All reservations received thereafter will be confirmed on availability only.

*Rooms will be held until 6 PM on day of arrival unless accompanied by deposit to cover that night's rental.

Check and mail to preferred hotel

☐ Holiday Inn Golden Gateway
 1500 Van Ness Avenue
 San Francisco, Ca. 94109
 Phone # (415) 441-4000

☐ Jack Ter Hotel
 1500 Van Ness Avenue
 San Francisco, Ca. 94109
 Phone # (415) 441-4000

RETURN THIS FORM WITH PAYMENT TO:
Meetings Registration
American Geophysical Union
2000 Florida Ave., N.W.
Washington, D.C. 20009

Days you plan to attend

☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday

DEADLINE FOR RECEIPT OF PREREGISTRATION
NOVEMBER 17, 1981
(rates applicable only if received by November 17 with payment)

	More than one day	One day
MEMBER	\$55	\$27.50
STUDENT MEMBER	\$25	\$12.50
NONMEMBER	\$75	\$37.50
STUDENT NONMEMBER	\$32	\$16.00

ABSTRACTS (NOVEMBER 10, EOS) \$5

SECTION LUNCHEONS/DINNER

Geodesy - Tuesday	\$8.00
Geomagnetism and Paleomagnetism - Thursday	\$8.25
Hydrology - Wednesday	\$8.00
Meteorology - Wednesday	\$8.25
Oceanography - Wednesday	\$8.25
Planetary/Volcanology, Geochemistry, and Petrology - Thursday	\$8.25
Solar-Planetary Relationships - Tuesday	\$3.75 (subsidized)
Solar-Planetary Relationships - Wednesday	\$12.00 (subsidized) Special Chinese Gourmet Banquet

Other payments (Please identify) \$

Total enclosed \$

(All orders must be accompanied by payment or credit card information. Make check payable to AGU.)

Meteorology	Nikko (T/K room)	11:45 a.m.	\$8.25
Solar-Planetary Relationships	Four Seas	8:00 p.m.	\$12.00 (subsidized)

- Special Chinese Gourmet Banquet
- Business meeting at 8 p.m., followed by the banquet at 7:30. Reservations in advance required.
- Program: Franklin, Meritt, NASA headquarters, will speak on the present status and future of NASA's space science program.
- Sponsor: RCA Astro Electronics/Government Systems Division.

Thursday, December 10

Planetary/Volcanology, Geochemistry, and Petrology	Nikko Banquet room	noon	\$8.25
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- An opportunity for members of both sections to meet in an informal atmosphere to discuss subjects of mutual interest.

Geomagnetism and Paleomagnetism	Nikko (T/K room)	11:45 a.m.	\$8.25
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PROGRAM SUMMARY

Union
 Voyager 2 at Saturn (I) (Tues AM)
 Voyager 2 at Saturn (II) (Tues PM)
 Voyager 2 at Saturn (III) (Tues PM)

Geodesy
 Earthquake Prediction (Mon PM)
 Gravity Field (Tues AM)
 Satellite Altimetry (Tues PM)

Geomagnetism and Paleomagnetism
 Earth Magnetism (Wed AM)
 Geomagnetism: Core, Crust (Wed PM)
 Sediment, Rock Magnetism (Thurs AM)
 Magnetite in Organisms (Thurs PM)
 Solar Wind/Transitions (Fri AM)
 Paleomagnetism (Fri PM)

Hydrology
 Earth-Sedimentation-I (Mon AM)
 Earth-Sedimentation-II (Mon PM)
 Reservoir Equations-I (Tues AM)
 Reservoir Equations-II (Tues PM)
 Groundwater Geophysics-I (Wed AM)
 Groundwater Geophysics-II (Wed PM)
 Groundwater Contamination-I (Thurs AM)
 Groundwater Contamination-II (Thurs PM)
 Water Quality Variability (Fri AM)
 General Hydrology (Fri PM)

Oceanography
 Marine Chemistry (Mon AM)
 Marginal Ice Zone II (Mon PM)
 Tropical Ocean II (Mon PM)
 HEBBLE II (Mon PM)
 Sediment Geochemistry (Mon PM)
 Marginal Ice Zone III (Tues AM)
 Verna Channel (Tues AM)
 MANOP (Tues PM)
 Mid-latitude Variability (Tues PM)
 Upper Ocean I (Wed AM)
 West Coast Shelf I (Wed AM)
 Hydrothermal Vents (Wed AM)
 Upper Ocean II (Wed PM)
 West Coast Shelf II (Wed PM)
 Sediments and Sedimentation (Wed PM)
 Southern Ocean I (Thurs AM)
 Lakes and Estuaries 6, C (Thurs AM)
 Coastal Topographic Effects (Thurs AM)
 Southern Ocean II (Thurs PM)
 Chemistry of Lakes and Estuaries (Thurs PM)
 Coastal Oceanography (Thurs PM)
 Physical Measurements (Thurs PM)
 MARSER I (Fri AM)
 Lakes and Estuaries P (Fri AM)
 Large Scale Circulation (Fri AM)
 MARSER II (Fri PM)
 Poly-mode Local Dynamics (Fri PM)
 Paleooceanography (Fri PM)

Planetary
 Outer Planet Satellites (Wed AM)
 Outer Planets (Wed AM)
 Primitives (Wed PM)
 Microwave Observations (Wed PM)
 Solar System Volcanism (Thurs AM)
 Terrestrial Planets I (Thurs PM)
 Terrestrial Planets II (Thurs PM)

Seismology
 Global Seismology I (Mon AM)
 Normal Modes (Mon AM)
 Global Seismology II (Mon PM)
 Earthquake Sources (Mon PM)
 Marine Seismology (Tues AM)
 Mostly Marine Multichannel (Tues PM)
 Mostly Multichannel Theory (Wed AM)
 California Seismology (Wed PM)
 Body Wave Theory (Wed PM)
 Crustal Structure (Thurs AM)

Solar-Planetary Relationships
 Precursors and Radon (Thurs AM)
 Comet and Meteor (Thurs PM)
 Meteoroids and Meteorites (Fri AM)
 Solar Wind (Thurs AM)
 Upstream Particle Waves (Fri AM)

Solar-Planetary Relationships
 Aeronomy
 Stratospheric Chemistry (Tues AM)
 Middle Atmosphere/D-Region (Tues PM)
 Thermosphere (Wed AM)
 Atmospheric Emissions (Wed PM)
 Ionospheric Holes (Thurs AM)
 Ionosphere Plasma (Thurs PM)

Solar-Planetary Relationships
 Cosmic Rays
 CR Transport/IMF Structure (Tues PM)
 Flare Particles/Shocks/ESP (Thurs PM)

Solar-Planetary Relationships
 Magnetospheric Physics
 Aurora and Substorms I (Mon AM)
 Currents and Fields (Mon PM)
 Ionosphere/Plasmasphere (Tues AM)
 Waves/Instabilities I (Tues AM)
 Reconnection (Tues PM)
 Energetic Particles (Tues PM)
 Dynamics Explorer (Wed AM)
 Lab/Space Experiments I (Wed AM)
 Jupiter/Saturn I (Wed PM)
 Lab/Space Experiments II (Wed PM)
 Jupiter/Saturn II (Thurs AM)
 Aurora and Substorms II (Thurs AM)
 Waves/Instabilities II (Thurs PM)
 Models and Methodology (Fri AM)
 Space Plasma Theory I (Fri AM)
 Space Plasma Theory II (Fri PM)
 Geomagnetic Perturbations (Fri PM)

Solar-Planetary Relationships
 Solar and Interplanetary Physics
 Solar-Terrestrial Theory I (Mon AM)
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